Space Weather Forecast

Issued on Saturday, 15 April 2023 at 01:10 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate-class X-ray flares (R1-R2 Minor-Moderate radio blackouts) throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity rose to moderate in the UTC day of Friday 14 April, with X-ray activity showing a rising background of more frequent Common-class flares, capped by a pair of low-end Moderate flares from a large sunspot group in the eastern solar hemisphere at 14/1618UTC and 14/2327UTC. This group was one of up to nine on the present facing side of the Sun, with the development of a small magnetically unipolar group in the southeast adding to the previous eight spot groups.

The main changes in the current cohort of active regions in the 24-hour period were marked areal growth in several of the larger and more magnetically complex groups on the Sun, whereas the recent most active spot of the past working week - by contrast - showed fading throughout in the southwest. The remaining groups were stable or unipolar and small.

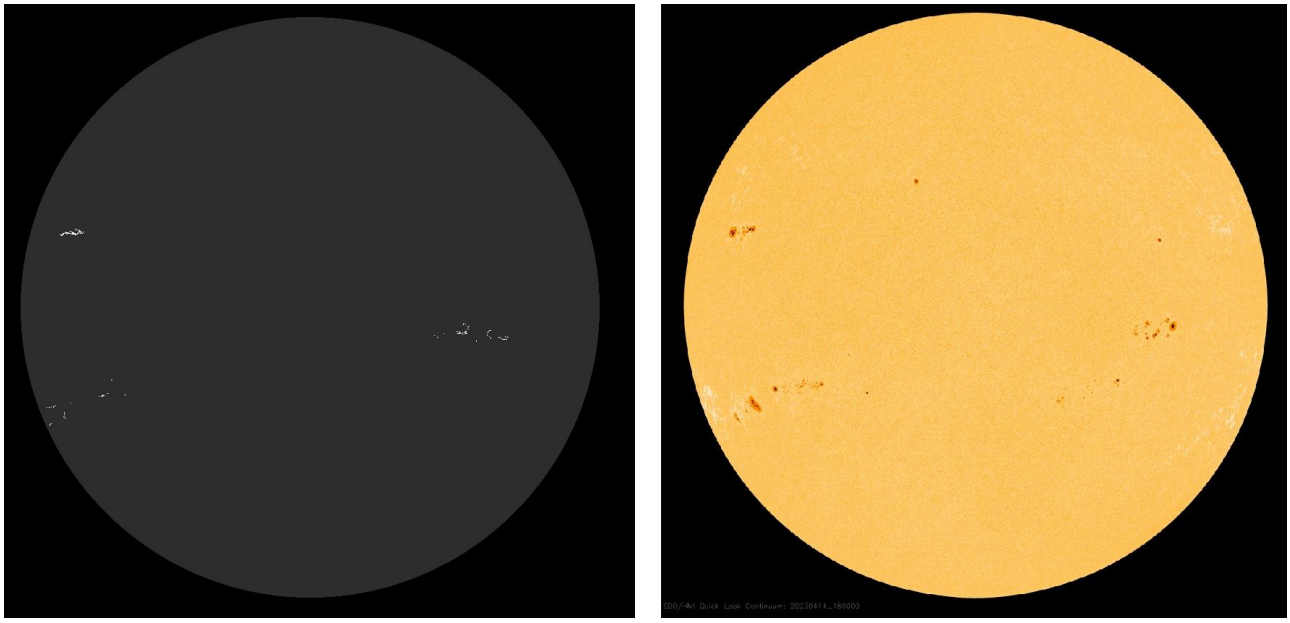

Figure 1: Left: X-ray flare locations of Common-class and above in the past 24 hours (to 14/2300UTC), courtesy of SIDC ROB. Left: visible satellite imagery showing the responsible sunspot regions (as at 14/1800UTC).

Satellite imagery for the period showed a large Coronal Mass Ejection (CME) heading east of the Sun-Earth line during the UTC evening, with frequent smaller releases from behind the eastern solar horizon. The larger CME is thought to be related to the earlier Moderate-class X-ray flare.

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This feature has been analysed, and while the results of modelling are not yet available, it is thought unlikely to be Earth-directed, with no new CMEs therefore thought to be en route.

Solar Wind / Geomagnetic Activity: The solar wind was at background levels throughout in a slow solar wind regime. The solar wind speed fell slightly within normal background levels, while the number of particles comprising the wind stayed within its usual range, as did their associated magnetic field. The north-south component of this field was variable in character, but again within typical background values.

The net effect of the above solar wind measures was for provisionally quiet geomagnetic activity throughout, well below Minor Geomagnetic Storm G1.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be low to moderate, with a chance of isolated Moderate-class flares. The frequency of small CMEs from beyond the eastern solar horizon is perhaps an indicator of larger active regions to come, although the risk is held constant until they present for analysis.

Solar Wind / Geomagnetic Activity: There is a low possibility of a glancing CME arrival on day two (Sunday 16 April) - this is the only CME in the forecast. Earth may also be affected by one or both of two 'coronal hole high speed streams' from the start of the four-day period, although with both driving features being at high solar latitudes, Earth may remain unaffected and in a slow wind regime throughout (effectively passing between them).

Resulting geomagnetic activity is expected to generally be mainly quiet - perhaps remaining as such throughout. There is a slight chance of Minor Geomagnetic Storm G1, most likely in association with any low confidence transitory CME pass.

Energetic Particles / Solar Radiation: Solar radiation storms are not expected and should remain at background levels, although there is a slight chance of a greater than S1 event as some of the more complex active regions transit towards the (better connecting) western solar hemisphere.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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